National Institute of Environmental Health Sciences

The impact of climate change on the expansion of Ixodes persulcatus habitat and the incidence of tick-borne encephalitis in the north of European Russia

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Abstract:

BACKGROUND: The increase in tick-borne encephalitis (TBE) incidence is observed in recent decades in a number of subarctic countries. The reasons of it are widely discussed in scientific publications. The objective of this study was to understand if the climate change in Arkhangelsk Oblast (AO) situated in the north of European subarctic zone of Russia has real impact on the northward expansion of Ixodid ticks and stipulates the increase in TBE incidence. METHODS: This study analyzes: TBE incidence in AO and throughout Russia, the results of Ixodid ticks collecting in a number of sites in AO, and TBE virus prevalence in those ticks, the data on tick bite incidence in AO, and meteorological data on AO mean annual air temperatures and precipitations. RESULTS: It is established that in recent years TBE incidence in AO tended to increase contrary to its apparent decrease nationwide. In last 10 years, there was nearly 50-fold rise in TBE incidence in AO when compared with 1980-1989. Probably, the increase both in mean annual air temperatures and temperatures during tick active season resulted in the northward expansion of Ixodes Persulcatus, main TBE virus vector. The Ixodid ticks expansion is confirmed both by the results of ticks flagging from the surface vegetation and by the tick bite incidence in the population of AO locations earlier free from ticks. Our mathematical (correlation and regression) analysis of available data revealed a distinct correlation between TBE incidence and the growth of mean annual air temperatures in AO in 1990-2009. CONCLUSION: Not ruling out other factors, we conclude that climate change contributed much to the TBE incidence increase in AO.

Source: http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3200433

Resource Description

Exposure :

weather or climate related pathway by which climate change affects health

Temperature

Temperature: Fluctuations

Geographic Feature:

resource focuses on specific type of geography

None or Unspecified

Geographic Location: ☑

resource focuses on specific location

Non-United States

Non-United States: Asia

Asian Region/Country: Other Asian Country

Other Asian Country: Russia

Health Impact: ☑

specification of health effect or disease related to climate change exposure

Infectious Disease

Infectious Disease: Vectorborne Disease

Vectorborne Disease: Tick-borne Disease

Tick-borne Disease: Tick-borne Encephalitis

Mitigation/Adaptation: ☑

mitigation or adaptation strategy is a focus of resource

Adaptation

Resource Type: ☑

format or standard characteristic of resource

Research Article

Timescale: ☑

time period studied

Time Scale Unspecified

Vulnerability/Impact Assessment: ☑

resource focus on process of identifying, quantifying, and prioritizing vulnerabilities in a system

A focus of content